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ZOO ANIMALS

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Friends of the Zoos

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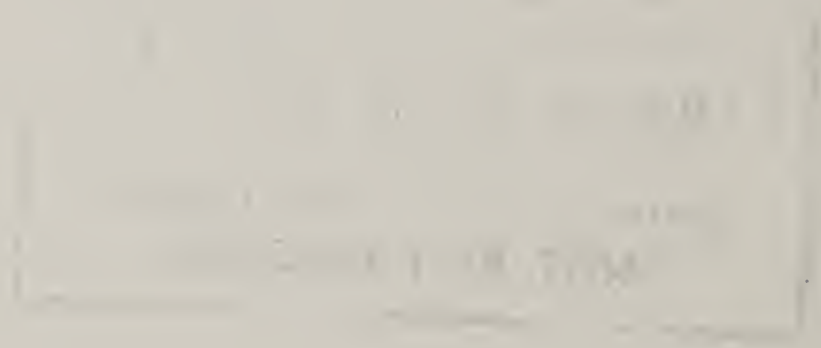
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AMERICAN FOUNDATION FOR THE BLIND
15 WEST 16th STREET
NEW YORK, NY 10011



ZOO ANIMALS

Produced by

FRIENDS OF THE ZOOS, VICTORIA.

IN TWO VOLUMES

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THE ZOOLOGICAL BOARD OF VICTORIA

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THE ROYAL MELBOURNE ZOOLOGICAL GARDENS

In 1857 a Zoological Society was formed in Melbourne, fore-runner of our Zoo. The Zoo has remained on its present site in Royal Park since 1862 when it received the government grant of 55 acres. There have been changes to its name, appearance and function but not to its size.

The Royal Melbourne Zoological Gardens together with the Sir Colin MacKenzie Zoological Park (Healesville Sanctuary) for Australian native animals and Werribee Zoological Park the open range zoo, are controlled by the Zoological Board of Victoria.

With its excellent animal husbandry, creative education programmes and imaginative landscaping of gardens and enclosures, Melbourne Zoo is classed as one of the best zoos in the world.

In the past animals were displayed for our entertainment to be laughed at, fed or teased. The emphasis now is on community education and recreation in pleasant surroundings.

Enclosures are constantly being updated to present animals in simulated natural habitats, satisfying to the animal, yet providing safe and effective viewing for the visitor.

Keeping Melbourne Zoo open every day of the year is a multi-million dollar operation. Staff totals 120 in five divisions: administration and public relations, animal husbandry including keeping and veterinary staff, education, horticulture and works.

A major criterion of good animal husbandry is a successful breeding programme. Continued breeding in zoos ensures a pool of animals for exchange with other zoos around the world, thus preventing further depletion of animals living in the wild. The Zoo makes a contribution to this area of conservation.

The Zoo Education Service, with a reputation acknowledged world-wide, provides programmes for students of all ages, designed to develop an awareness of the inter-relationships of plants, animals and humans with the environment.

Friends of the Zoos (FOTZ) was formed in November 1979 as a voluntary support group to encourage interest in the three zoos, and the FOTZ Volunteer Guide Service plays a major role in this area. For further information regarding Friends of the Zoos or guided tours please contact the Zoo on (03) 347-1522.

A visit to the Zoo offers recreation in pleasant surroundings and an opportunity to understand that humans are part of a biological system on which we, too, depend for our survival.

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ABOUT THIS BOOK

"ZOO ANIMALS" has been designed as a zoo pre-visit book to help people with visual disabilities enjoy Melbourne Zoo.

This book, which is in two volumes, will be best used prior to a walking tour of the Zoo accompanied by a special guide from the Voluntary Guide Service of the Friends of the Zoos who has been trained to assist visually disabled visitors.

Special arrangements for large and small groups can be made by prior booking to include a guided walking tour with the added opportunity to touch and feel such things as animal skins, bones, eggs and feathers and to handle some of the small animals in the Education area of the Zoo.

For further information and bookings contact the Melbourne Zoo on (03) 347-1522 and ask to be put in touch with the Tour Co-ordinator of the Guide Service.



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MAMMALS

Mammals, the animal group of which humans are members, have made their homes in a wide variety of habitats over much of the surface of the globe.

All mammals share several characteristics. They are active, warmblooded creatures, maintaining a steady body temperature and generally being insulated against heat loss with a coat of hair or fur. Infant mammals are the only animals nourished by their mother's milk, a food specially adapted to their early needs. During the period of suckling, a strong bond may be forged between mother and offspring.

The largest group of mammals is the placentals which have a specialized organ (the placenta) to nourish the unborn young within their mother's body. Therefore young placental mammals may be born very well developed. The other two groups, the monotremes and the marsupials, do not produce young in this way.

The monotremes bear the marks of their reptilian ancestry, laying eggs that have a typically reptilian, soft, leathery shell. The young break out of the shell by means of an egg-tooth at the tip of the snout, like a hatching reptile or bird. The platypus and the Australian and New Guinea echidna are the only monotremes in existence today. They have no nipples and the young lick up the milk secreted on to the mother's fur from milk glands on her belly. The word monotreme means one opening referring to the cloaca or common passage for reproduction and elimination of body wastes.

The marsupials commonly possess a pouch or fold of skin covering the female's nipples. At birth the young marsupial is a tiny, hairless foetus. It crawls from the birth canal into its mother's pouch and attaches itself to one of the nipples. Most of the young's development takes place in the pouch. Marsupials are found only in the Americas and Australia. This diverse group ranges from the vegetation eating kangaroos and koalas to the meat eating quolls. In kangaroos and possums, the pouch opens to the front, while in wombats, koalas and bandicoots, it opens backward. This is a useful adaptation for digging animals, as the young are protected from flying earth.

In placentals, the young are born at an advanced stage. Some, such as giraffe, are able to stand and follow the mother immediately after birth, while others, such as lions, are blind and helpless. Some placentals give birth to a litter of ten or more, but many have only one young at a time.

There are about 4,500 species of mammals which have evolved along many different lines so that today they vary enormously in structure and behaviour. The insectivores most closely resemble the shrew-like ancestor from which all mammals were derived.

They have simple teeth and relatively small bodies and brains. More complex mammals have developed a larger brain so that their behaviour includes a wide range of learned as well as innate responses to the problem of survival. Humans have developed sufficiently to have a complex culture together with spoken and written language all based on a marked ability to learn.

Mammals live in many different habitats and this is reflected in the various shapes of their bodies, their limbs and their teeth. There are herbivores with hooves, carnivores with claws and omnivores of all kinds; mammals that burrow, nest or build dams and mammals with or without teeth, tails and toes.

They have adapted to land, sea and air. Some, such as otters, are semi-aquatic, but whales and dolphins have returned completely to the water, the environment which their amphibian ancestors left many millions of years ago. Bats are the only flying mammals though a number of other mammals can glide.

Some mammals live on the ground, others in trees, while some, such as moles, spend most of the time underground. Animals of the plains such as deer and giraffe have long limbs that enable them to escape from danger by running fast, while sloths are so completely adapted to an arboreal existence that they are virtually unable to walk on the ground. Primates show various degrees of adaptation to life in the trees but only humans, among the primates, are exclusively ground dwelling.

More than a third of all living species of mammals are rodents. They are the most numerous and widespread mammals and are adapted for swimming, burrowing, climbing, gliding or running.

Mammals are just as diverse in their feeding habits as in their movements: from a fresh kill to carrion, insects to fish, grass, fruit, bark, leaves and roots. Diets may be very specialized (some bats feed only on blood) or quite general (humans are omnivorous).

BIRDS

Birds, like mammals, are warmblooded creatures and because they are not dependent on the temperature of their environment are able to lead active lives in widely differing habitats. The feature that sets them apart from all other animals is that they have feathers. These help them regulate their body temperature and make it possible for most of them to fly.

There are about 9,000 species of birds ranging in size from the flightless ostrich which stands taller than a person to the tiny bee-hummingbird no larger than a little finger.

Each species has its own range which may be an entire continent or just a few square kilometers. Some species migrate half way round the world each year.

Birds have hollow bones for lightness, no teeth, earholes generally covered with feathers, good hearing and excellent eyesight and scaly feet. Their toes are variously arranged, to suit a particular habitat. For instance, climbing and perching birds have long toes, wading and swimming birds have webbed feet, birds of prey have grasping toes and curved claws.

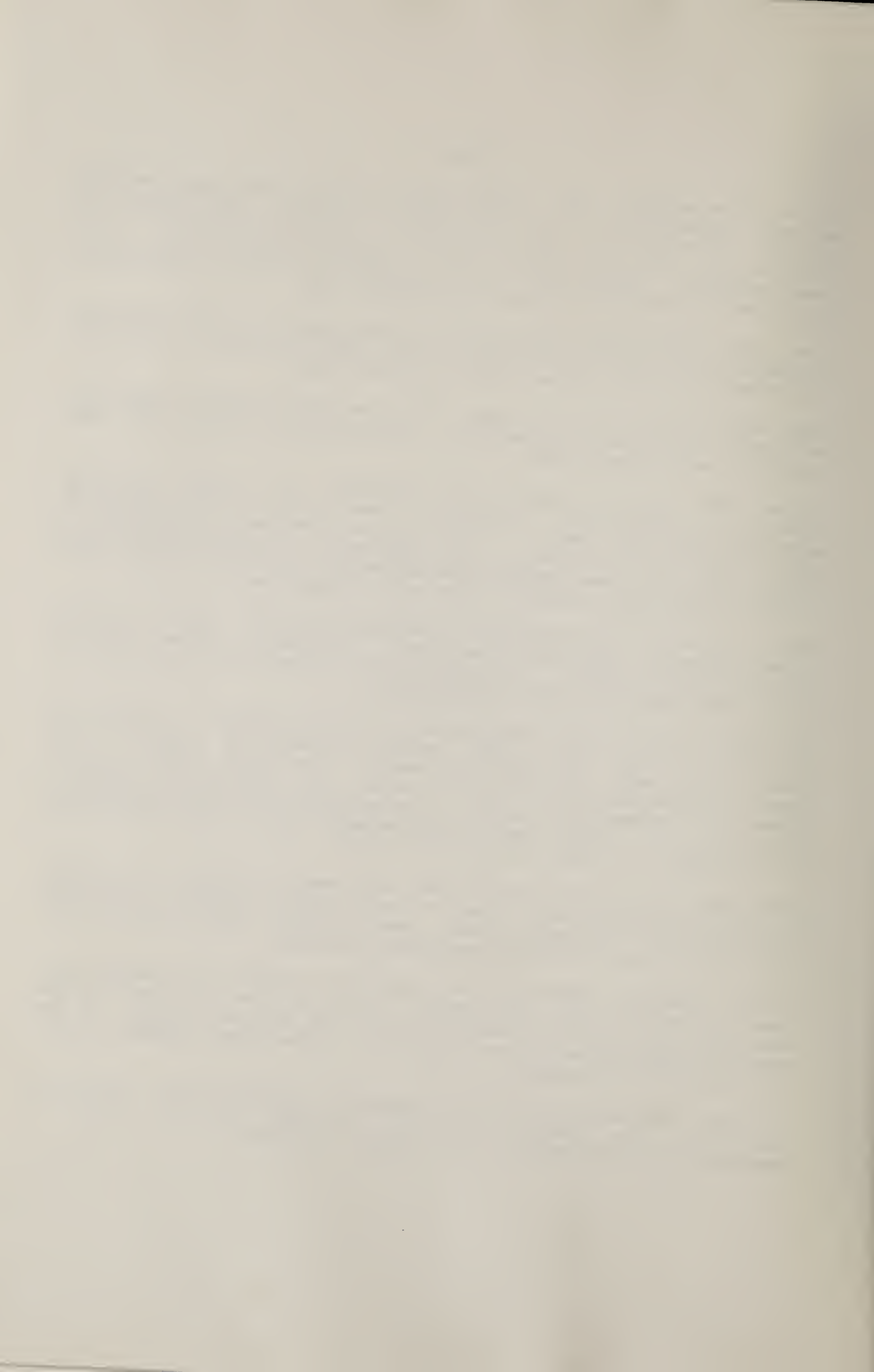
Their wings too are shaped for various purposes. There are the broad wings of the soaring pelicans; the long narrow wings of gliding pacific gulls; wings made for manoeuvring such as the broadbased tapering wings of swallows.

The food a bird eats determines its bill design. Herons and kingfishers have long, sharp beaks for spearing fish, finches short, broad ones for shelling seeds. The broad flat bills of tawny frogmouths help them to scoop up insects or rodents. Powerfully-hooked and sharply-pointed beaks are characteristic of birds of prey while many honeyeaters have slim, elongated, curved beaks to probe flowers for nectar.

Birds have distinctive calls and many make a variety of sounds. Birdsong is particularly used in the breeding season to proclaim a territory or attract a mate. Many birds, such as cormorants and doves, have elaborate courtship displays.

Birds choose a nesting site and build a nest for egg-laying. These range from the untidy stick nests of the cormorant to the neat mud bowl of the apostle bird, the shallow scrape in the ground of the stone curlew to the intricate woven chamber of the white-plumed honeyeater.

In some species both parents share in incubating the eggs and caring for the young. In others the job is left solely to females but occasionally, as in emus, to males.



REPTILES

Reptiles were the first vertebrates to live totally on land. Long ago in the age of dinosaurs, reptiles were the dominant land animals with a greater diversity of species than exists today. Over 6,000 species of modern reptiles include 25 species of crocodiles and 250 species of turtles and tortoises, the rest being snakes and lizards.

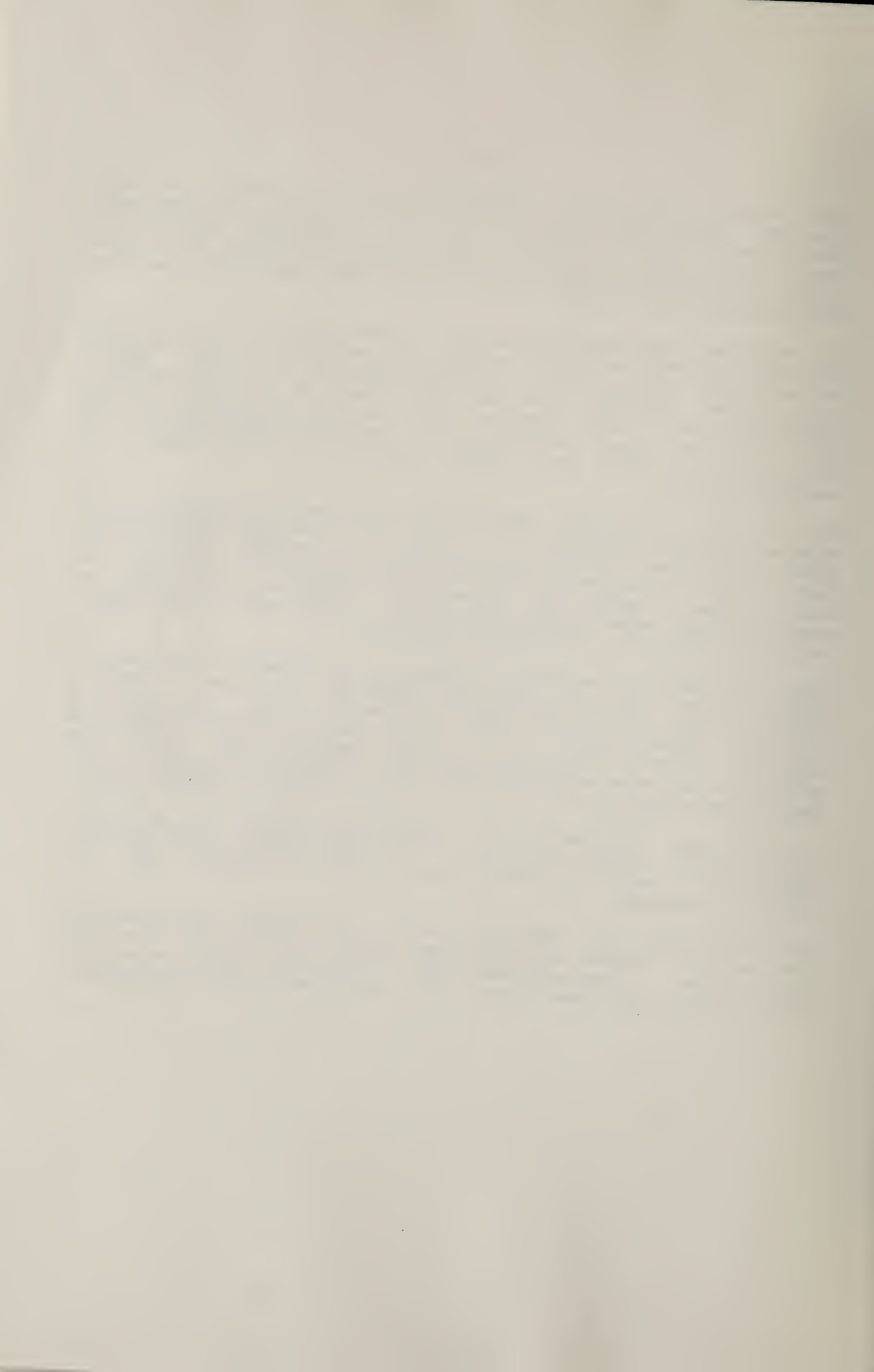
All reptiles have scaly skins but to the touch they vary from the soft, velvety skins of geckos, the prickles of some dragons or the hard, horny plates of crocodiles and tortoises. Being cold-blooded, reptiles use the sun's heat to warm themselves, regulating their body temperature by moving in and out of the sun. As they need warmth to be active, most species are tropical and there are fewer species and individuals in temperate zones.

Reptiles reproduce with eggs, which are usually leathery. The eggs are laid in clutches of various sizes and some species bury them - tortoises in sand and crocodiles in mounds on the river bank. Warmth from the sun or decaying vegetation incubates the eggs. Some lizards and snakes give birth to live young by retaining the eggs inside the female's body until they hatch. Young reptiles are independent at birth.

Reptiles live in a variety of habitats and display a variety of structures for life on land, in trees and in water. Aquatic turtles have fully-developed flippers while land-dwelling tortoises have clawed feet. Snake bodies reflect different habitats. Brown snakes are built for speed on land. Green tree pythons have more muscular bodies for constricting prey, while death adders have worm-like tails that wriggle to attract prey.

Lizards show adaptation of form and colour to different environments. Though typically four-legged with spread toes for running on land, bearded dragons have opposable toes for gripping branches.

Reptiles' diets are equally diverse. Crocodiles are flesh and fish eaters. Snakes are also meat eaters but they swallow their prey whole. Tortoises and most lizards eat both animal and plant matter, but some lizards such as iguanas eat only plants.



INSECTS

Insects comprise about three-quarters of the species of the animal kingdom, having established themselves in almost every habitat. There are more than a million known species.

They all have a firm supporting skin or exoskeleton that can be adapted into many forms including wings.

An insect's body is divided into three parts: head, thorax and segmented abdomen. The head bears a pair of feelers or antennae that vary greatly in different species. The mouthparts may be adapted for chewing, piercing and sucking or, as in butterflies, just for sucking.

All insects have three pairs of legs attached to the thorax which also usually bears one or two pairs of wings. The wings may be transparent as in dragonflies, hard as in beetles or covered in tiny scales as in moths and butterflies.

Insects reproduce by laying eggs. On hatching the young may be a replica of the adult or completely different in form. Grasshoppers and crickets hatch as miniature adults, whose exoskeleton is moulted periodically to allow them to grow to adult size. Flies, beetles, moths and butterflies hatch as caterpillars or grubs. These change form radically in pupae from which they emerge as adult insects.

THE GIRAFFE

The giraffe is the tallest animal in the world. The bull is about three times the height of a human and the cow half a metre shorter. The giraffe's knees would be level with your elbow and its belly above your head.

Fig. a shows a side view of a giraffe with its slender legs, short body and long neck. Though longer than its body, its neck still only has seven vertebrae the same as man and a mouse.

In its habitat, the grasslands of central and southern Africa (map Fig. e) the length of its neck allows it to browse on the high foliage that is out of reach of other animals. It uses its exceptionally long blue-black tongue and tough mobile lips to pluck leaves and shoots (Fig. c). Copious thick saliva helps the giraffe to swallow its favourite food, the thorny acacia (Fig. d) but it also feeds on other trees and shrubs as well as flowers, seed pods and fruit.

The giraffe can go for long periods without water. In Fig. b. its front legs are splayed as it lowers its head to drink. This drawing also shows the short stiff mane along its neck, and the large side-set eyes which give the animal all-round vision. It has small tufted horns between its mobile pointed ears.

Orange-brown patches on a giraffe's coat vary in shape and shade in different races. Reticulated giraffe have a bold geometric pattern (Fig. f). Each giraffe has its own markings.

The metre-long tail with its tuft of black hair (Fig. f) makes an excellent whisk against biting insects.

Herds of giraffe consist of twenty or more individuals including a male leader, cows, calves of various ages and some adolescent bulls. Young bulls determine dominance by "necking," a ritualised fighting where the necks are slowly intertwined and the animals push from side to side like a bout of arm-wrestling.

Breeding takes place at any time of the year. Fifteen months after mating the one young is born in special calving grounds. The young is dropped to the ground feet first. It is tall enough to suckle and within the hour can run fast enough to keep up with its mother and escape predators.

A giraffe can gallop at 60 kph. easily outdistancing a lion, its only predator. It can fells a lion with one sharp kick from its large, cleft hooves (Fig. b)

THE GORILLA

The gorilla is the largest of the apes, a powerful animal with wide shoulders, a broad chest, long arms and short legs. When standing up (Fig. a) a male gorilla is as tall as a man and weighs two or three times as much. Females are shorter and lighter than males.

Most of a gorilla's body is covered with coarse black hair which turns silver-grey on the backs of mature males (Fig. a). Ridges of bones over the eyes and on top of the skull give its head a helmet-like appearance (Fig. c). Gorillas have leathery black faces and forward facing eyes above broad flat noses. Noseprints are as distinctive to gorillas as earprints are to elephants and fingerprints to humans.

The gorilla habitat is the rainforest area of Central Africa, lowland gorillas living in the Congo Basin to the west while mountain gorillas inhabit the mountains of eastern Zaire and western Uganda (map Fig. b).

Forests provide a varied diet of leaves, buds, bark and fruit. A gorilla's large hands are similar to a human's (Fig. d), while its hand-like feet are adapted for climbing trees, the big toe being more like a thumb (Fig. e). A gorilla spends most of the time on the ground. It usually walks on all fours, feet flat on the ground and the upper body supported on the knuckles of the hands (Fig. f).

Groups of up to thirty animals, led by a silverback male, include younger adult males, females with young and independent juveniles. The group is constantly on the move over its 30 square kilometre territory. At night gorillas build a simple nest on the ground or in a tree.

Breeding can take place any time of the year, the young being born about eight-and-a half months after mating. A baby gorilla is the size of a small human baby and just as helpless. For the first three months the mother carries it constantly, holding it close to her chest. Then it will ride on her back, clinging to her fur, until it is three years old.

Though gorillas look fierce, they are gentle animals unless attacked. They can make about twenty different sounds from a baby's whimper to an angry male's roar. When a gorilla is excited or wants to frighten away intruders, it stands up and slaps its cupped hands against its chest, making a sound like a drum, or it will throw sticks or earth.

THE PLATYPUS

Only in the permanent bodies of water of eastern Australia, from Queensland to Tasmania, will you find that unique animal, the platypus (map Fig. b). Similar in length and thickness to a person's forearm, its tail about hand-length, its densely-furred streamlined body is superbly adapted to the water. Male platypuses are slightly longer and somewhat heavier than females.

Fig. a. shows a view from above and Fig. f. a side view of a platypus, with its flat duck-like bill, webbed feet and flattened tail which acts as a rudder during swimming and a fat storage area for lean times. The bill (Fig. c) is soft, rubbery and very sensitive to touch, movement and vibration. A platypus uses its bill to locate food and to find its way round under water. The eyes and ears, housed in a groove, and the nostrils near the tip of the bill, close when the animal dives.

Platypuses are most active at dusk and dawn searching for food along the river bed. Caddisfly and mayfly larvae are a regular part of a diet which includes worms and freshwater shrimps. They have no teeth but store food in cheek pouches and crush it between horny plates.

They propel themselves through the water using alternate strokes of their webbed front feet. The hind feet are only partially webbed and in the male equipped with a poison spur (Fig. e). Platypuses use their hind feet to steer while swimming and to anchor the body while burrowing.

The burrows, dug into the banks of the river with the entrance above water level, are used for nesting and sleeping. They provide a comfortable temperature for platypuses all the year round. After mating in August, a female lines a nesting chamber with vegetation carried in with her tail. Usually two oval eggs about the size of a five-cent piece are laid and the mother incubates them for six to ten days by curling her body around them.

For three to four months the young feed by lapping up the milk secreted on to the mother's fur from milk glands on her belly. When they emerge from the burrow about February, they are nearly three-quarters adult size and soon lead independent lives.

THE SULPHUR-CRESTED COCKATOO

Sulphur-crested cockatoos are large white birds, whose strident calls are familiar sounds in forests and farmlands over much of eastern Australia (map Fig. f). They are also found in New Guinea and some Indonesian islands.

The bird is named for its bright yellow crest (Fig. b) which it raises after alighting (Fig. a). The short neck and legs, prominent eyes, large head and compact bulky body (Fig. d) are characteristic of birds of the parrot family. So too is the strongly hooked beak (Fig. b) and the toe arrangement with two toes forward and two back (Fig. c).

Sulphur-crested cockatoos feed on the seeds of grasses, agricultural grains, nuts, berries, fruits, blossoms, roots and insects. They are troublesome pests in cereal-growing areas, digging up newly-sown seeds and attacking ripening grain.

In southern Australia, outside the breeding season, they congregate in large flocks, sometimes with other cockatoos especially galahs and little corellas.

Each flock has its own roosting site which is rarely deserted even if the cockatoos have to fly long distances to feed. While the flock feeds on the ground, sentinels in the trees and on the ground will screech loudly at any intruder and the flock takes off as one. During the hottest part of the day the cockatoos shelter in surrounding trees, nibbling the leaves or stripping away bark. When they return to the roosting trees at dusk, the noise is deafening as the birds squabble and jostle for position.

When the birds are in flight, the strong yellow wash on the underside of the flight and tail feathers is visible. Fig. e. shows three different wing positions. The characteristic flight is a series of rapid shallow wing beats indispersed with brief periods of gliding.

Breeding lasts from August to January in the south. In the courtship display the male, his crest raised, struts along a branch towards the female. Chattering softly, he bobs his head up and down. Mutual preening follows.

The nest is in a hollow limb or hole high up in a eucalypt tree. Both sexes sit on the two to three white eggs which hatch after thirty days. The chicks remain in the nest for six weeks before joining their parents in the flock.

The Sulphur-crested cockatoo's ability to mimic human words makes it a popular pet.

THE BEARDED DRAGON

Bearded dragons are among the most adaptable of Australia's dragon lizards, being found throughout most of eastern and central Australia except in the far north (map Fig. c). The habitat includes both the coastal regions and the arid centre.

Being so wide-ranging, the colours vary considerably to allow the lizards to blend into their own particular environment. Colours range from dull yellow through orange-brown to black. The colour lightens as the heat becomes intense and will change depending on the lizard's emotional state.

Fig. d. shows the dragon from above with its light-weight body, long tail and limbs that end in clawed toes. Up to half a metre in length, the bearded dragon is covered in what appear to be prickly spines that are actually soft to touch. The side view of the head (Fig. b), is enlarged to show the resting position of the spiky-looking pouch which gives bearded dragons their name; while in Fig. a. the beard is puffed out and the yellow-lined mouth gapes open in a typical aggressive display.

Bearded dragons display when cornered or facing a rival in dispute over territory. As well as raising the beard and hissing, they can inflate their bodies displaying their spikes, but more often, when disturbed, they will just lie still to escape detection.

Lizards are always more active in warm weather when they can bask in the sun to warm their bodies. Bearded dragons are often seen sunning themselves on stumps or fenceposts or on roadside verges. Their main food is insects but they also eat other small lizards and mice as well as flowers. They can flick out their short yellow tongue (Fig. c.) to pick up their food, but mostly eat chunks of food whole.

In heat over forty degrees the dragons take shelter under a rock or bush or in a burrow. They can move fast and over hot sand raise their tails and stand up on their legs, running with only their toes touching the ground. When escaping, they may stand up and run on their hindlegs, balanced by their long tails.

Breeding involves an elaborate courtship display. The male turns black underneath and brightly coloured yellow and green above. He stamps with his fore-feet, jerks his head up and down, opens his yellow-lined mouth and raises his beard.

After mating, the female scoops a hole in the ground and buries herself in it. She lays eight to twenty-four eggs and carefully covers them with sand. The young, always grey, hatch three months later.

THE WANDERER BUTTERFLY

Butterflies, among the most beautiful of insects, have many patterns and colours. Their wing spans range from the size of a thumbnail to the size of a person's hand.

Wanderer butterflies have a striking pattern of orange and black on their wings which have a dark border with lighter spots. Fig. f. is enlarged to show the wing markings while Fig. b. gives an overview at about lifesize. You can trace the four spread wings, the shape of the butterfly's body and the clubbed antennae on the head.

In Fig. a. a Wanderer is resting with its wings folded together showing the segmented body and the three pairs of legs attached to the thorax. The extended proboscis, the long sucking tube, enables the butterfly to feed on nectar. When not in use, the proboscis is curled up under the butterfly's head.

Wanderers are widespread in Australia from Northern Queensland to Victoria and South Australia (map Fig. g). They spread to Australia from North America about 1870. Called there the Monarch butterfly, they are known for long migrations, flying south to spend the winter in Florida

The butterflies' migration to Australia followed the introduction of milkweeds on which they feed. Tiny white eggs are laid singly, mostly on the underside of the leaf (Fig. c). After three to eight days larvae emerge; cream hairy caterpillars with shiny black heads. The caterpillars moult five times as they grow, changing each time. In its final stage the body is smooth and cylindrical, boldly banded in brown, yellow and white (Fig. d). Caterpillars absorb poisonous chemicals from the milkweed so that both they and the butterflies are distasteful to birds.

After three weeks the caterpillars pupate. Attaching themselves upside down to a twig or leaf with a silk pad, they shed the final skin. In the soft new skin they shrink upwards, acquiring the shape of the chrysalis. This is smooth and squat, pale green in colour with some gold spots (Fig. e). Unlike butterflies, moths usually pupate inside a spun silk cocoon.

The butterflies emerge after about fourteen days, with moist, soft, creased wings. They cling to their chrysalis while drying out. Wanderers fly at about 17 km. an hour and can reach 48 km. an hour for short periods.

It is one of about 400 species of butterfly recorded for Australia.

HABITATS

The relationship of plants and animals to each other and to their place of living is a major part of the web of nature. The geographical features land and water, historical arrangements of the continents, the substrate of rock and soil and the climatic happenings, temperature and rainfall, all contribute to the organisms living space.

The combinations of the above create a range of habitats for animals to occupy. The steaming tropical forests support a variety of forms not found in the cold, treeless Arctic tundra. The variety of habitats within this range create an array of living spaces each of which supports its own assembly of fauna.

The two-page World Habitats Distribution Map uses an oval shape projection divided through the Atlantic Ocean. Textures represent the four habitat classifications of forest, grassland, desert and other (including mountainous and polar) regions.

Life began in water and aquatic habitats cover over two-thirds of the planet. The oceans contain more living creatures, in greater variety, than all the land habitats put together. They range from the largest living creature, the blue whale, to microscopic plankton.

Even within the classifications of forest, grassland and desert, great diversity exists. Where rainfall is abundant throughout the year, forests dominate. But in hot climates these are lush, tropical jungles whereas temperate climates produce a range of deciduous, evergreen or mixed forests.

Where rainfall is sparse or seasonal, a variety of grasslands occur. Dry grasslands, such as the prairies and steppes, are virtually treeless. Those with good seasonal rain, such as much of the high African tableland, support tree and shrub cover as well.

Deserts, which cover about one-fifth of the world's surface, occur in hot or cold climates with little rainfall. Few deserts are entirely without rainfall or vegetation. Typical hot deserts support a patchy covering of thick-stemmed cactus or tough, almost leafless shrubs. Grasses and herbs grow and flower quickly after sudden brief rainstorms. Warm, sunny days turn into cold, even frosty, nights.

TROPICAL RAINFOREST

Richest of all habitats, rainforests grow in tropical regions where rainfall is abundant and temperatures are high throughout the year. Established for millions of years, rainforests have accumulated an immense diversity of species. The Amazon forest alone includes over 4,000 kinds of trees and more species of birds than in the whole of North America.

Flowering and fruiting are spread throughout the year so there is always food for herbivorous animals. Insects, lizards and snakes abound. The main tree canopy rises to about 100 metres and layers of smaller trees and shrubs below provide further arboreal habitats. The forest is a three-dimensional mosaic of habitats varying in height, shade and the availability of food and each storey shelters plants and animals different in habitats and adaptations from those living above and below.

Many animals such as the South American Spider Monkey, have specially adapted limbs and tails. Others such as the Tree Kangaroo have long sharp claws for climbing branches, while some animals such as the Sugar Glider have a membrane which allows them to glide from tree to tree.

GRASSLANDS - THE AFRICAN SAVANNA

The animals of the savanna form a complex food web and each species has adaptations which allow it to survive in the presence of many others.

Some grazers such as zebras specialize in eating the coarse tops of the grass while others eat the soft leafy centres.

Browsers also divide their food, giraffes feeding on the higher leaves while elephants eat the lower leaves, branches and bark.

Carnivores also use different resources. Lions hunt large prey working alone or in pairs. Cape Hunting Dogs take similar prey to lions, but work in packs. Leopards catch more arboreal prey, cheetahs run down smaller antelope and the smaller cats, such as caracals, catch small birds. Meerkats feed on very small mammals and insects as do jackals, which also eat carrion.

DESERT ADAPTATIONS

Despite the dry conditions, many plant and animal species have adapted successfully to desert life. Many animals can survive drinking little or no water, satisfying their needs from their prey or plants. Some have specially constructed kidneys or nostrils to reduce water loss, while others such as Rat kangaroos and Shingle-back lizards store fat in their tails to provide food in lean times.

Most small desert animals such as Fennec foxes escape extremes of temperature by living in burrows. Central Australian Euro kangaroos shelter in the shade of rocky outcrops. Many desert dwellers such as Guanacos and Collared peccaries feed mainly at night when conditions are cooler.

Camels let their body temperature rise far above normal by day, radiating excess heat after dark. Other animals, such as Fennec foxes, have huge ears which act as heat radiators, dispersing body heat.

Desert rodents and lizards are long-legged, often running on hind legs to keep their bodies off the hot sand.

ANIMALS AND HUMANS

Humans have always depended on animals. People have hunted them for food and used their fur, skin and wool for clothing and shelter. Many different animals have been domesticated; cattle in Southern Russia, the Yak in Tibet, Reindeer in Lapland and Alpaca and Llama in South America.

Animals are put to work in other ways. Horses are ridden but also used as beasts of burden as are camels and donkeys. The Egyptians tamed cats to protect storehouses of grain from mice and rats. Insects are useful too: bees produce honey and silkworms spin cocoons from which silk fabric is made.

Animals have been used in battle, for sport of many kinds and for pleasure as pets. They have been changed by selective breeding to produce longer wool or more meat or milk. They have been exploited for their fur, skins and tusks.

Though some animals such as crocodiles, snakes and sharks will occasionally attack people, it is the transmitters of disease, such as the malaria-carrying mosquito, which pose a greater threat to humans.

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ENDANGERED SPECIES

Many species of animals that once thrived on the earth do not exist today. Evolution takes a natural toll as new species evolve that are better adapted for survival in our constantly changing environment. But in the last few hundred years many species have disappeared and hundreds more are threatened with extinction due to the deliberate or unthinking actions of humans.

The greatest threat to wildlife is the loss of habitat, principally the drainage of wetlands and the destruction of forest for timber or agricultural expansion. As prairies are ploughed, rainforests felled, rivers dammed, marshes drained, roads, towns and cities constructed, the specialised habitats of animals disappear. The needs of a swelling population and the demands made by modern industry in the exploitation of mineral wealth add further pressures.

Overhunting has endangered some species. Traditional hunting methods did little harm to animal populations. But with the introduction of the rifle large numbers of animals could be killed in a short time. In the nineteenth century some sixty million American Bison were reduced to a few hundred animals. With modern technology, such as trawl nets, commercial exploitation can result in significant danger to some species. Explosive harpoons and giant factory ships reduced the blue whale population from 200,000 to less than 1,000 before the whales were protected.

Pollution has had a disastrous effect on many species, with industrial wastes virtually obliterating the wildlife from many rivers and inland waters. We have yet to fully understand the harmful long-term effects on animals of chemically-treated seeds and pesticides.

Introduction of species to new habitats, either by accident or design, occurred as people voyaged to new lands. The result was often catastrophic for local populations and for the habitat. The introduction of rabbits to Australia caused great destruction of grassland, affecting the populations of many species. Competition and predation by introduced animals such as foxes and cats have wiped out other species in Australia since European settlement.

We have come to realise that living in harmony with nature is essential for the future of mankind. Many measures are now underway around the world to protect endangered species and their habitat

THE ASIAN ELEPHANT

The elephant is the largest land mammal, so large that when standing next to it, a person's head would be level with the elephant's thigh. An adult male can weigh 5000 kilos. The most conspicuous feature is the trunk, an elongated nose and upper lip more than 2 metres long with which the elephant can touch, taste, smell, suck and breathe. The trunk with its rings of muscle and 2 finger-lips at the tip, is so flexible and sensitive that it can pick up a single nut from the ground and it is so strong that it can lift a huge log. The Asian elephant has been trained for centuries to work in the forests.

(fig a) shows a side view of the Asian elephant which is found in India and Sri Lanka (map fig c) and also in parts of south-east Asia. Its massive body has a thick grey hide, almost hairless, but its tail has wiry black hair at the tip. The legs are like great pillars and end in broadly rounded, heavily padded feet, with 5 toenails on the front feet and 4 on the back feet. Long eyelashes protect the small eyes which have poor vision. Hearing is acute and the huge ears, like open fans, are always flapping to pick up sound. They also act as a cooling system. (figs b and d).

With the trunk down (fig b) the elephant can pluck grass or drink without kneeling. It sucks the water up into the hollow trunk and squirts it into its mouth. The ability to raise the hollow trunk, as in (fig d) allows the elephant to reach higher branches and leaves. It can also spray water over its back on hot days or dust over itself to keep insects away. The animal blows air through the trunk to make its loud trumpeting sound.

Some elephants have a pair of ivory tusks protruding from each side of the mouth. These are actually enlarged front teeth. They can grow up to 3 metres long in an adult male African elephant but are shorter in the female. The tusks can be useful weapons but are usually used for digging up roots or trees. The elephant only has 4 teeth at a time, one up and one down on each side, but each tooth is the size of a football. It has 6 sets of teeth in a lifetime and when the last set is worn away it can no longer chew its food. This limits the elephant to a lifespan of 60-70 years.

Elephants range over forest, open woodland and grassland eating grass, leaves, roots, bark and fruit. They live in family groups of 10-20 led by an older female and may join with other family groups to form larger herds. Adult bulls may live singly or in bull herds which may join up for a time with family units. Groups are constantly on the move in search of food as an adult male needs to consume 250 kgs a day. He has a stomach large enough for two children to play in. Elephants must also drink daily and enjoy bathing in waterholes.

Females are generally mature at about 15 years old and a single calf is born 22 months after mating. It will suckle at the 2 nipples between its mother's front legs for at least 4 years which is the usual interval between births. Both the mother and the other elephants in the family group are very protective of the young.

THE SPIDER MONKEY

The spider monkey is an agile monkey with black to buff fur, long skinny limbs and an even longer tail. It lives in the forests of South America (map f) from the Amazon basin to the Pacific and up through Central America to Mexico.

It has the typical rounded head (fig a), small face and flat nose of the New World monkeys. The nostrils are broadly separated and face sideways, quite different from the downward-nosed Old World monkeys.

The spider monkey's most distinctive feature is its long tail which is used as a fifth limb. It can grasp objects at its tip and can curl it around a branch to support the whole weight of the animal by itself. The underside of the tip (fig b) is naked and has a pattern like fingerprints to increase gripping power.

Living high in the forest canopy, spider monkeys like to swing through the trees. The elongated hand without a thumb (fig c) is specialised as a hook, while the foot has an opposable big toe like our thumb. (fig e) shows the monkey hanging from a branch by one hand and its tail. As well as swinging they can walk on either 2 limbs or 4.

Spider monkeys feed largely on fruit. Their home range varies with the food supply. By day they move in groups of females and young but sometimes they are accompanied by an adult male. Males are dominant and aggressive to other males when females are present. They threaten intruders by vocalizing with barks and by breaking and dropping branches.

At night they form big groups of up to 100. They sleep in trees curled up in a sitting position with the tail curled round a support.

The single young is born about 4 months after mating. At first it is carried on the abdomen then on the back with its tail curled round that of its mother. The youngsters spend a lot of time playing together.

Spider monkeys are generally gentle animals and there are few fights in the group. Their lifespan is between 12e and 25 years.

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THE LION

Apart from the tiger, the lion is the largest and most powerful of the big cats. The lion stands as high as a person's waist and its body length is 3 times its height. Males can weigh as much as 3 men but females are smaller and lighter

(fig a) shows the front view of the head of a male with the broad face surrounded by a thick mane. The large yellow eyes give the animal keen sight. It has a broad nose, and, like all cats, stiff sensitive whiskers. The open mouth reveals the sharp canine teeth used for grabbing and killing prey.

The teeth and powerful jaws are accentuated in the side view of the head of a female (fig b). A lioness has no mane. Hearing is acute and the ears are constantly moving to catch any sound.

In the side view of a male lion (fig d), the mane covers the head and shoulders of the stocky, muscular body. The coat colour varies considerably from sandy-buff to tawny-yellow with the mane generally darker. The long tail ends in a tuft of black hair. The strongly curved claws are only bared for catching prey or in defence.

The lion's range was once widespread. Now, apart from a small population in India, it is found only on the open grasslands and scrub country of Africa (map fig c). Here they live and hunt in loose family groups called prides which can vary from 3 or 4 individuals to as many as 30. A typical pride consists of several related lionesses and their cubs with one or more related males.

The pride has a territory over which it hunts. Though the dominant male eats first, the females do most of the hunting. They often work together, stalking their prey before rushing in for the kill or waiting in ambush at waterholes. Their favourite food is zebra, antelope and wildebeast, but when necessary they will attack domestic animals and occasionally humans.

They can run fast for short distances and can jump well, but their usual gait is a walk or trot. Some climb and rest in trees. Mostly lions are inactive by day and hunt at night.

Lionesses give birth approximately every 2 years. 2-4 cubs are born in each litter. They are born fully furred with spotted coats. At 6 months they are weaned and start to join in the hunt with their mother. Between 18 months and 2 years they become independent.

In the wild lions live more than 10 years.



THE TIGER

Tigers are the largest of the cat family and their habitat extends from Siberia through China and Malaysia to Indonesia and India.

The ground colour of the coat is typically orange with dark vertical stripes. The pattern blends well with the natural light and shade of the animal's forest habitat. In India (map fig c) it lives in all types of forests as well as grass jungles, swamps and bamboo thickets.

(fig a) shows a tiger's rounded head and small ears. Its face is striped but its muzzle, as well as its chest and belly are white. The white cheek whiskers are denser in males. Like fingerprints, each set of whiskers form a unique pattern. The yellow eyes have excellent night vision.

The side view of a standing tiger (fig d) shows the long muscular body. Its tail is nearly half the head and body length. The open mouth reveals its sharp canine teeth. It has powerful limbs and the hairy paws have rubbery pads for a noiseless tread.

Cats walk on their toes. The tiger's front paw, enlarged in (fig b) has 5 toes, the hind paw has only 4. While walking, the large curved claws are sheathed to retain their sharpness. The tiger has a smooth, graceful walk with both limbs of one side moving together. It can travel at great speed, climb and is an excellent swimmer. It often lies in water to keep cool. Tigers are mainly solitary animals and usually hunt at night either stalking or lying in ambush before leaping on their prey.

They kill a variety of prey which includes deer, wild pig and buffalo and even frogs and lizards in times of food shortage. They are known to kill domestic cattle and, occasionally humans. Large prey is dragged into thick cover and the tiger will return to it a number of times to feed. It will eat about 2 kilos at one feed.

Tigers are most vocal at mating time. A tigress will mate every 2-3 years from the age of 3 to 11 years. 2-6 young are born after a gestation period of approximately 105 days, but usually only half the litter will survive to maturity. The young are born blind but have the striped tiger coat. The cubs remain dependent on their mother for food until they are about 2 years old.

Tigers seldom live more than 15-20 years.



THE BROWN BEAR

The Brown bear is the most widely distributed of all bears, adapted to habitats ranging from semi-deserts to Arctic tundra and from sea level to high mountain country. The various races are spread across the northern hemisphere, living in Europe, Asia and western North America.

They vary considerably in size, the American Grizzly bear being nearly 3 metres in length and weighing 5 times as much as a person, while the European Brown bear pictured is 2 metres long and half the weight of the Grizzly bear. Males are always larger than females.

(fig c) shows the typically large dog-like head and short neck. The eyes and ears are small and of all the senses, smell is the sharpest and vision the least acute. (fig b) gives a view of the bear from the front, with its short but powerful limbs ending in broad, flat feet with strong claws on its toes.

Brown bears have a prominent hump between the shoulders (fig d), a hollowed out facial profile and smooth pointed muzzle. The stocky body has almost no tail and is covered with coarse shaggy brown fur.

The bears are omnivorous, eating berries, wild fruits, honey and small animals. In some areas fish are scooped out of shallow pools with a paw and may form a large part of the diet. In cold climates bears will accumulate fat reserves in autumn and spend the winter months in hibernation.

They move through the forest at a walk or may run fast over a short distance. They can stand on 2 legs when reaching up and can also climb and swim.

They are not normally aggressive but are unpredictable if wounded or disturbed. When attacking they use both their front claws and their teeth and may rise on their hindlegs and shuffle towards an opponent (fig a).

Bears are solitary animals except in the breeding season. Females give birth to 1-3 cubs in the winter den. They are born very small and helpless staying with their mother in the den until spring and then accompanying her for a year before becoming independent.

Females breed every second year from the age of 2. Bears may live up to 30 years in captivity, but much less in the wild.

THE AUSTRALIAN FUR SEAL

Eared and True seals are marine mammals beautifully adapted to water but spending periods of time on land to rest, breed and moult. Eared seals have small external ear-flaps which have been dispensed with in the True seal. Both are superb swimmers with good eyesight however their swimming techniques are different. Eared seals make long rowing sweeps with their front flippers which enable them to glide through the water. Their back flippers play no part in swimming except perhaps as a rudder. The True seals on the other hand use their back flippers exclusively for swimming. True seals have much better breath-holding capacity than Eared seals which seldom dive for more than a minute or so. On land the Eared seals are more agile and are able to use all 4 flippers in a variety of gaits from a shambling walk to a fast gallop. They can also clamber up steep rocks. The back flippers of the True seals are virtually useless and on land they crawl along on their bellies. Both seals have a well developed sense of sight, hearing and touch.

Australian Fur seals belong to the Eared seal family and have dense fur. (fig a) shows a male with its head turned sideways, the massive neck and shoulders supported on its front flippers and the body tapering to the back flippers. Adult males are about 2 metres in length and very heavy, weighing about 4 times as much as a person. Females are smaller and much lighter. Size and strength are important to the male in breeding season. Each successful male claims a territory of about 60 sq. metres defending it from other males with vocal threats and aggressive postures and it uses its powerful teeth when necessary. The Australian Fur seal is now abundant, though in the 1800s it was hunted almost to extinction. Today it is found on the rocky islands of Bass Strait and along the coast of Victoria, Tasmania and southern New South Wales.

Birth and mating occur over a 6 week period in November and December. One pup is born to each female and the strong maternal bond is maintained by the mutual recognition of calls and odour.

A few days after the birth the female initiates courtship with one of the territorial bulls. After mating she goes to sea to feed, returning 2-5 days later to suckle her pup. She alternates feeding and suckling for about 8 months by which time the pup goes with her and begins to take solid food. It is weaned at about 10 months.

Both sexes reach puberty at 4-5 years but males do not breed until they reach territorial status.

THE RED KANGAROO

Kangaroos are large marsupials with long hindfeet and powerful limbs that enable them to move in fast bounding leaps. The largest, the Red kangaroo, is found in the dry areas of central and western Australia (map fig b). It lives in scrub, grassland and desert and is semi-nomadic. On mild days it may bask in the sun but seeks any available shade on really hot days.

It feeds mostly at night, eating grasses and other herbage. It is named from the pale to red-brick colour of the male while the female is usually grey.

(fig a) shows a side view of a female kangaroo standing upright, balanced on its tail with a joey in its pouch. You can see how small the front limbs are compared to the hind ones. The adult male may grow taller than a person. The female is much smaller.

The joey (fig a) has its head out of the forward-facing pouch. It crawls into the pouch when it is born, a tiny hairless creature about the size of a little toe. It develops there, attached to one of the 4 teats, and by the time it is ready to leave the pouch, at about 8 months, it is a miniature adult.

The mother already carries a fertilised egg which will now start to develop. Even when the new joey is in the pouch, the older one will continue to put its head in to suckle. The kangaroo is unusual in being able to produce two formulas of milk at the same time. One formula for the older joey from one teat and a different formula for the newborn from another teat.

(fig c) the head is enlarged outlining the mobile ears and pointed muzzle. Like the body, it is covered with dense fur except for the bare black nose. A broad white stripe extends from each corner of the mouth to the ears.

The close-up of the front paw (fig e) shows the strong sharp claws. When a kangaroo is hopping (fig d), the body is bent forward and the tail acts as a balance. For slow movement the weight is taken on the front limbs and the tail while the hindlimbs are swung forward together.

Red kangaroos may live in small or large groups numbering several hundred. Many of the young fail to reach maturity, especially in drought years and few live longer than 10 years of age.

THE KOALA

The koala is a tree-living marsupial, about the size of a small dog, found only in eastern Australia from Queensland down to South Australia (map fig e).

As its diet is mainly eucalypt leaves of certain species it can only live where there are suitable food trees, notably River Red Gum and Forest Red Gum in the north and Grey Gum, Manna Gum and Blue Gum in the south-east. The word Koala comes from the Aboriginal for 'no drink' as the animal gets most of the moisture it needs from its food leaves.

The koala is well adapted for its life in the trees. It has a special digestive system to cope with the kilo of leaves it eats every day, and special paws for grasping while climbing.

(fig a) shows a side view of a koala climbing a tree. Its head shows the large fluffy ears and the rounded body which is covered with thick woolly fur, generally brown in the small koalas of the north and ash-grey in the larger southern koalas.

Their limbs are strong and muscular and the paws have rough pads and long curved claws to assist in gripping. The hand enlarged (fig c) has 2 fingers opposing the other 3 which gives the koala a firm hold on branches. The hindfoot, enlarged in (fig d) has a clawless first toe while the second and third toes are joined together and used for grooming.

In the side view of the animal (fig b) the black nose, small eyes and long sloping forehead are emphasised. The rump is hard and flattened as the koala spends most of its life resting and dozing in the forks of trees.

The koala is mostly active at night and may travel some distance on the ground. When climbing it holds on with its front feet and it brings up its hindfeet together in a bounding movement. On the ground it similarly bounds along on all fours.

Except during mating and mothering the koala lives a solitary life. The male is territorial in the breeding season, keeping other males away with loud grunts and marking trees with scent from a gland on its chest.

In the summer breeding season one young is born 35 days after mating. The blind, hairless joey, not much longer than a thumbnail, crawls into the backward-facing pouch and attaches itself to a teat. After 7 months it is fully developed and leaves the pouch. For a time it feeds on digested eucalypt leaves excreted by the mother to wean it from a diet of milk to a diet of leaves. For the next 5 months it travels on its mother's back and at a year old it is independent and will soon move away on its own.

THE WOMBAT

The wombat is a stocky, heavily built animal which spends most of the day in a burrow, emerging mainly at night to feed. Only knee-high and about a metre long, it has a barrel-shaped body on short strong legs and a flattened head and rump (fig d).

The Common wombat lives in the forests of south-eastern Australia and sometimes in more open woodland and heathland. The Hairy-nosed wombat inhabits the dry plains of South Australia, the Nullarbor and a small area of south-east Queensland (map fig b).

(fig a) shows a front view of a Common wombat with its dense fur, broad face, short ears and blunt bare nose. Its open mouth reveals the upper and lower incisor teeth which make sharp tools for slicing through grasses and roots. A wombat's teeth grow continuously throughout life.

Its powerful forelimbs with 5 strong-clawed toes (fig a) are used for digging its burrows. The hindfoot (fig c) has no claw on the first toe, but all 4 feet are used for shovelling the earth out of the burrow.

Slopes above creeks and gullies are favoured sites for burrows which may be up to 20 metres long. They may divide underground and have several entrances and more than one bedding chamber. Smaller burrows are used for temporary refuge and a wombat may visit up to 4 burrows each night within its home range. In a night's feeding it may travel up to 5 kilometers.

Breeding may occur at any time of the year. The rear-opening pouch of the female contains 2 teats but usually only one young is born. It remains in the pouch for about 6 months and at heel for another 11 months.

Common wombats become sexually mature after 2 years and may live at least 5 years in the wild and up to 20 in captivity. Though generally nocturnal, they may be seen basking or feeding during the day. They are not generally aggressive, but when attacked they turn their leathery rump towards the aggressor and kick out with their hind feet.

THE EMU

The emu is a large flightless bird, second only to the ostrich in size. It stands as tall as a person. The female emu is usually larger and heavier than the male.

It is found only in Australia (fig b) over a large area which includes arid plains, scrub and woodland. It is extinct in Tasmania.

The side view of the emu (fig c) shows the shape of the body which is covered with grey-brown feathers with black tips. The plumage is soft and drooping, giving the bird a shaggy appearance. The long powerful legs which end in large feet with 3 toes are clearly portrayed (fig d).

(fig a) shows the neck and head with the sharply pointed beak and sparsely feathered neck. The beak enables the emu to feed on a wide variety of leaves, grasses, fruits and flowers as well as insects such as grasshoppers and caterpillars.

Emus are nomadic and often cover long distances. They run with a bouncy swaying motion and for short bursts can reach up to 50 kms. an hour. They can swim well too.

Though they may be found singly, groups of dozens and occasionally hundreds may occur in remote areas. In times of drought they may move into agricultural areas and cause damage to grain crops.

Males and females pair up in the summer and stay together for some months before the winter breeding season. The nest is a bed of grasses, bark or leaves in a scrape in the ground. The female may lay as many as 20 eggs though 7-11 is more usual. The large eggs are dark grey in colour and are bigger than the palm of a person's hand.

After laying the female wanders off while the male incubates the eggs for 8 weeks. When the brown and cream striped chicks hatch, he cares for them during the day and broods them under his feathers at night, sometimes looking after them for up to 18 months.

Both sexes make grunting sounds but the female also makes a sound like deep drumming.

THE AUSTRALIAN PELICAN

The Australian pelican is a very large bird, so large that when it stands it would be level with a person's thigh. Almost half the height is the long neck which is shown (fig a) together with the equally long bill and throat pouch which is the pelican's most distinctive feature.

Australian pelicans are mainly white in colour with black on the wings, rump and tail. The bill and pouch are pink. Different species are found all over the world. The Australian pelican lives and breeds throughout Australia (fig b) where there are lakes and swamps or by the sea.

Though pelicans may be seen feeding alone, eating crustaceans as well as fish, they are often found in flocks. They swim slowly in formation, encircling a shoal of fish or driving them into the shallows. They dip their bills in unison engulfing the fish in the pouch and allowing the water to drain out.

(fig d) shows a side view of the pelican with its bill open and pouch extended. The pouch also helps disperse body heat, allowing the pelican to roost and nest, often in hot exposed situations. (fig d) also gives you an idea of the solid squat body and short legs with large webbed feet. Because the legs are set far apart and to the rear for efficient paddling, the pelican has a waddling gait when it is on land.

Although the take-off is rather clumsy, pelicans are magnificent fliers and often travel long distances. In flight they intersperse wingbeats with long glides, sometimes skimming over the surface of calm water and other times soaring thousands of feet on thermal air currents. When the wings are outstretched (fig c) the wingspan is wider than a person's extended arms. A flock may be seen flying in V or line formation.

Pelicans nest in small to very large colonies, usually on bare islands either on the coast or in inland lakes. The mature birds, over 4 years old, develop a brighter coloured pouch at courtship time. Calls are associated with courtship displays, though away from the nest the birds are normally silent, with just occasional grunt-like sounds.

After pairing the female selects the nesting site and both birds collect sticks and plants. They build these into a platform on a rough scrape in the ground. 2-4 white eggs are laid and the birds take turns incubating them while the mate looks for food. The young hatch after 32-35 days and for the next 100 days both parents will feed the chicks.

FAIRY PENGUINS

Penguins are flightless seabirds living on fish, crustaceans and molluscs caught underwater. They are superbly adapted to the sea with a streamlined body and wings modified to flippers which they use to propel themselves through the water. They swim effortlessly and can survive at sea for long periods. When at rest they lie on the surface of the water with flippers outstretched for stability.

There are 18 species of penguins living in the southern hemisphere. Most nest on islands of the southern oceans or Antarctica. The Little or Fairy penguin is the smallest and is the only one to breed in Australia. When it stands upright, its head would come no higher than a person's calf.

(fig a) shows a side view of 2 penguins facing each other, bills open, one of the many courtship postures displayed by different species of penguin. The illustration shows the sleek sturdy body with its thick neck and short tail. The short legs are set far back on the body enabling it to steer in the water or to stand upright and waddle on land. The toe nails are long and the feet webbed.

In the front view of the Fairy penguin (fig b) the flippers are outstretched and the head turned sideways. Like all penguins the head, back and flippers are dark blue-grey and the underside is white. The feathers are short and fine and resemble fur. A thick layer of down next to the body helps provide insulation.

(Map fig c) shows the Fairy penguin's range along the south coast of Australia from Fremantle in the west to northern New South Wales as well as Tasmania and islands in the Bass Strait. It is also found in New Zealand.

Fairy penguins come ashore at dusk. On Phillip Island, near Melbourne, they can be seen every night coming out of the surf and forming into groups before crossing the beach to their burrows in the sand dunes.

Numbers are greatest in the breeding season from July to March. Males often mate with the same female as the previous year and may occupy their old burrow or dig a new one nearby. 2 white eggs are laid and both birds share the 5 week incubation and the feeding of the chicks. The bird's call is a braying sound which rises to a crescendo.

After 8 weeks the chicks are ready to go to sea. The parents will also go to sea to fatten up before coming ashore again for 2-3 weeks to moult

THE CROCODILE

The crocodile is a large amphibious reptile with a thick armoured skin, a powerful tail and strong jaws with sharp teeth. Crocodiles and their relatives, the alligators, caimans and gharials, are found in warmer waters in various parts of the world.

In Australia there are 2 species of crocodile living in the tropical waters of the north, the smaller thin-snouted Freshwater crocodile and the larger Saltwater crocodile which is pictured. It is found in the rivers and along the coast of northern Australia (map fig d) and also occurs in India through Malaysia and Indonesia to New Guinea.

(fig c) shows the crocodile's broad snout, heavy body and long muscular tail. The length of the adult crocodile is 2-3 times the height of a person. The body is covered with squarish horny scales, leathery to touch, with ridges along the back.

When the crocodile is swimming the slightly webbed forelimbs are held close to the body and the fully webbed hindlimbs are used for balance. The sideways movement of the tail propels the crocodile through water.

(fig a) the head is enlarged and the mouth is open to display the long jaws and rows of conical teeth. New teeth grow throughout life, pushing out the old ones. The teeth are used for grasping the prey and not for chewing, as the food is swallowed whole or in large sections.

The nostrils and eyes are set high on the head (fig a) so that the animal can almost completely submerge yet still be able to see and breathe. These crocodiles hunt mostly at night, feeding on fish turtles, lizards, snakes birds and mammals and sometimes on smaller crocodiles as well. Animals such as wallabies, kangaroos and occasionally man are seized when they come to the water to drink or bathe. The prey is held under the water until it drowns.

The Saltwater crocodile can often be seen basking in the sun on riverbanks during the day. On land it may move with surprising agility on its short sturdy limbs (fig b).

The female crocodile lays her eggs in the wet season, usually in January or February. Using her hindfeet she scrapes together a nest of mud and vegetation above the high tide level. She lays up to 70 white, brittle shelled eggs about twice the size of a hen's egg and covers them with decaying vegetation. She guards the nest until the young hatch about 3 months later. They break open the shell with the aid of an egg-tooth on the end of the snout, the tooth is lost after hatching. When small they have many predators and a low survival rate.

THE PYTHON

Pythons, like all snakes, are elongated legless reptiles. They are non-venomous snakes killing their prey by tightly coiling their body around the victim until it suffocates.

They are found in Africa and Asia as well as Australia where the 13 species include Australia's largest snake, the Amethystine python. The Carpet python (fig a) occurs all over the continent except in southern Victoria and part of Western Australia (map fig d)..

(fig a) shows the snake's long cylindrical body tapering at the tail. It is covered with small scales that allow the skin to stretch to accommodate larger prey. Snakes move in a sinuous glide, the ripple of muscles being visible along the length of the body.

The head and part of the trunk (fig b) display the bold pattern of the Carpet python. It is very variable both in pattern and colour, but is typically pale to dark brown with black blotches or bands. It can grow more than 3 metres in length. The Carpet python can be found over a variety of habitats from rainforests to deserts. Like most Australian pythons it is largely nocturnal in its habits, though it sometimes likes to bask in the sun.

In forest areas it is usually found at night in low shrubs or trees, resting during the day in hollow limbs or logs. In drier inland regions it spends more time on the ground, often in burrows but it also takes to the trees in search of birds and other mammals.

The long jaw (fig c) is so loosely jointed that the snake can swallow animals larger than the diameter of its body. Like all snakes the python swallows its prey whole, drawing it inward with its backward curving teeth, followed by muscle contractions.

(fig c) shows the typical snake eye with no moveable eyelid. Rather than hearing sound, snakes feel vibrations through the ground. Their forked tongue is constantly flicked in and out to sense their surroundings.

Carpet pythons are egg-layers and the female protects and incubates the eggs. They are piled in a clump and she coils her body around them. The female lays 10-40 eggs, and depending on the temperature the eggs take 60-80 days to hatch.

Growth in reptiles causes them to slough - the shedding of the outer skin. This function occurs more frequently when they are young but in adults can occur every 30-40 days to less than once a year.

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